PROFESSIONAL FORUM

Javelin

A Quantum Leap in Infantry Weapons

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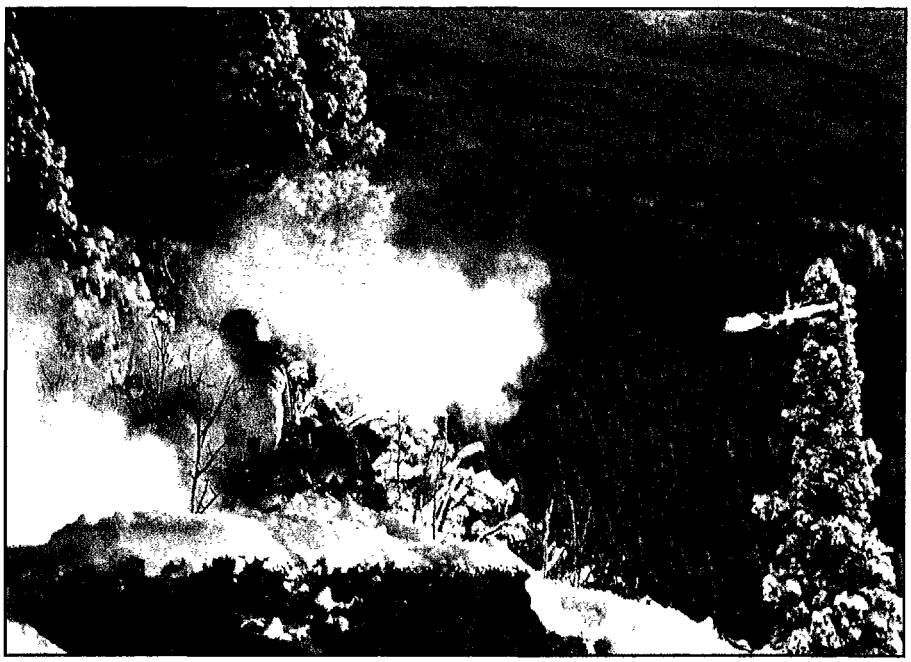
The Javelin antitank missile system represents an advance in infantry weapons technology comparable to the invention of the machinegun. It enables light infantry to deploy anywhere in the world within hours and carry with it the means to defeat mechanized and armor forces. Light forces equipped with Javelin will soon be among the most lethal and versatile within the Force XXI battlespace.

The Army and Marine Corps are beginning to capitalize on the lethality and firepower that light infantry gains with the addition of Javelin. During recent combat training center rotations with light forces, Javelin-equipped units have decisively defeated mechanized and armor forces on a regular basis. Commanders have selectively employed Javelin gunners as antiarmor snipers during the defense, deploying them in concealed positions and fortifications with numbers of pre-stocked missiles.



The Javelin is a medium-range, manportable, shoulder-launched antitank weapon system that employs true fire-and-forget technology.

Due to Javelin's extended range capability, battalion frontages have grown to 16 kilometers wide and six to eight kilometers deep.

During one battle, a Javelin-equipped battalion was credited with destroying approximately 75 percent of all reconnaissance elements, forward security elements, a motorized rifle battalion (MRB), and lead elements of the follow-on MRB. During another battle, one company destroyed an estimated 60 opposing force (OPFOR) vehicles while itself sustaining minimal casualties.

The OPFOR units made locating Javelin positions an intelligence priority, dispersing chemical munitions on suspected dismounted positions, but without success. The rotational unit eluded most OPFOR indirect fires by occupying sub-optimal and less detectable positions, utilizing the inherent flexibility gained with extended engagement ranges and man-portable weapons. The light forces negotiated all terrain, with little loss of mobility during all weather and light conditions, and occupied those positions that best supported their engagement areas. When equipped with Javelin, a dismounted light infantry force performing at or above standard dramatically enhances its opportunity for success against a mounted or armor threat.

During Operation *Desert Storm*, soldiers who deployed as part of the 82d Airborne Division expressed their concern about holding terrain against the armor and mechanized threat. But with the advent of Javelin, every gunner has the ability to destroy any known armor and to employ the missile's secondary capabilities against helicopters and ground fighting positions. The system has an engagement range that extends from less than 100 meters to more than 2,500 meters and may be deployed on any terrain.

The System. The Javelin is a medium-range, manportable, shoulder-launched antitank weapon system. It is the infantry's only antiarmor system that employs true fire-and-forget technology. The system consists of a command launch unit (CLU) and a missile contained in a disposable, composite launch tube assembly (LTA). The gunner acquires a target through the CLU and activates the missile. The gunner can select either a lofted trajectory for top-attack or a flatter trajectory for the direct-fire mode. It takes about 10 seconds to download the missile software from the CLU and cool the missile seeker, which uses a focal plane array (FPA) to form an infrared image of the target. The gunner then locks the missile's feature-based autotracker onto the target. After launch, the missile guides itself to the target using its onboard FPA seeker, image processing ability, and tracking algorithms. The missile, adjusted by its on-board tracker, then flies to the target for the kill.

The field tactical trainer, which is attached to the tactical CLU, allows gunners to engage multiple integrated laser engagement system (MILES) targets during gunnery and field tactical exercises. A simulated round contains a MILES scoring system and a launch-effects simulator. Events can be played back and reviewed using the instructor station.

Survivability. The Javelin dramatically enhances soldier survivability through its fire-and-forget capability, its soft-launch feature, its minimal launch signature, and its ability to defeat armored targets. Soldiers increase their own survivability by using fortifications and by taking advantage of the system's unique characteristics. First, they do not have to leave structures to engage targets. The soft launch allows for firing the missile from bunkers, buildings, and fighting positions with overhead cover. Second, when firing Javelin, the gunner does not have to remain exposed to enemy fire until the missile reaches the target. As soon as he pulls the trigger, he is free to continue whatever mission has been assigned to him or seek cover. Depending on how the unit conducts resupply and the number of missiles that are with the system, the gunner is capable of engaging several targets per minute.

Both the signature and the soft launch of Javelin are unparalleled among ground-based antitank missiles. The system's soft launch and top-attack missile flight path minimize the signature. When the trigger is pulled, a launch motor flies the missile out of the LTA approximately 18 feet down range. This stage of engagement is referred to as a soft launch due to the demonstrated effects on the gunner. Upon completion of the launch motor impulse, the flight motor ignites. The signature from the flight motor depends upon the weather; higher humidity increases the condensation trail, but smoke from the flight motor is negligible.

The Javelin training system is composed of the basic skills trainer, designed for classroom and shipboard use, and the field tactical trainer, for advanced instruction and field training exercises.

The flight motor activates following soft-launch sequence, sending the missile, in top-attack, to an altitude of more than 100 meters above the target until it dives to make the kill. The probability that ground troops, concentrating on ground operations, can detect either the missile in flight or the gunner's location, is minimal. In fact, the Javelin gunner may never be detected, and enemy forces will not be able to determine what has engaged them.

SYSTEM CHARACTERISTICS

General:

Type:
- Man-portable antitank weapon
- Carry weight: 49.2 pounds
- Shelf life: 10 Years
- Ready to fire: < 30 seconds

Command Launch Unit (CLU):
- Type: Passive target acquisition/fire control, with integrated day/thermal sight
- Carry weight: 14.1 pounds
- Magnification:
  - Day sight = 4X
  - Thermal sight = 4X and 9X
- Operation time: 4 hours/battery (hot)
- Battery type: BA5590/BB390

Round:

Missile-
- Type: Passive imaging infrared (IIR)
- Guidance: Lock-on before launch, automatic self-guiding
- Weight: 35.1 pounds (11.8Kg)
- Length: 42.6 inches (1081.2 mm)
- Diameter: 5.0 inches (126.9 mm)
- Range: > 2,000 meters

Training. The Javelin training system is composed of the basic skills trainer, designed for classroom and shipboard use, and the field tactical trainer, developed for advanced instruction and field training exercises.

The basic skills trainer consists of an instructor station and a simulated missile round and CLU to teach gunners basic target identification, acquisition, and lock-on skills. The instructor can select the mission scenarios and score the gunner's performance.

The Javelin training system has proved effective. Out of the 70 missiles fired by first-time gunners during 1998, virtually all hit their intended targets and most hit the vehicles' turrets. Gunners understand that if the missile is detected during flight, the target's options for evasive action are very limited. If the target is a vehicle, then the combatants may either dismount or maneuver the vehicle to any formidable overhead protection, such as a bridge culvert. No current or projected countermeasures have been identified that significantly decrease the effects of the Javelin missile against stationary or moving targets. Low Rate Initial Pro-

duction (LRIP) missiles have a 96 percent reliability with a high level of confidence.

Maintenance and Logistics. The Javelin Project Office maintains a database of all maintenance actions, called JAVTRAK. It includes a software program for maintenance, logistical data collection, and analysis. Contractor logistical support personnel enter all identified faults, part requests, part status, repair status, repair time, identified malfunctions, and disposition of all systems. The information may be configured to identify or highlight any of these items. This excellent tool gives managers, engineers, contractors, logisticians, quality control personnel, and limited users valuable information for management of their Javelins.

The Javelin's maintenance and reliability exceed the Joint Services Operational Requirement (JSOR) of 92 percent. Current missile reliability is over 96 percent, and CLU reliability is equally impressive. The CLU has built-in-test (BIT) capability that is designed to detect and isolate the required 95 percent of faults. The current test has demonstrated more than 99 percent fault isolation with less than one percent false alarm rate. The JSOR requirement of mean time between operational failures is 129 hours; Javelin is now running approximately 280 hours. No direct support test program sets are required, and no additional tools are needed to repair the system.

Maintenance for the CLU is a three-level concept: operational, intermediate (27E MOS), and depot. Operators are responsible for recognizing CLU failures through BIT. The 27E maintainers provide direct support and are responsible for replacing shop replaceable units (SRUs) and sending inoperable items to depot level. The SRUs are integrated circuit cards, four in one CLU model and two in the other. The mean-time-to-repair requirement is less than 1.5 hours with actual repair times being 0.75 hours or less, depending on experience level. Depot-level repair is currently being conducted at Fort Bragg, North Carolina, by the manufacturers. Equipment requiring this type of maintenance is shipped to Fort Bragg, and turnaround time for repair has been less than 30 days.

The Javelin missile is classified as a wooden round. All of the information the missile requires for successful launch and target engagement is housed within the CLU. Once the CLU is mated to the round and the seeker button is depressed, the CLU downloads all information to the missile.

While this may not sound very impressive, this feature accomplishes two important operational functions: First, the information download provides essential information that allows the missile to be fire-and-forget and obtain its phenomenal probability of hit. Second, any software enhancements to the system can be accomplished in minutes through the interface between a portable memory loader verifier (MLV) and the CLU. This greatly reduces future system upgrade costs and schedule for the redesign of hardware. Units will no longer have to retrofit to obtain the latest in Javelin technology. Only a software change will be needed to upgrade Javelin; qualified personnel will take their MLVs to the unit arms room and spend minutes transferring data to CLUs.

Javelins have been fielded to the Rangers, selected Special Forces units, and the 82d Airborne Division.

Although Javelin is new to the field, the senior leaders witnessed the system's effectiveness in 1997, during the Advanced Warfighting Experiment at the National Training Center. General Dennis J. Reimer, Chief of Staff of the Army, said, "As we start to perfect our ability to work our heavy forces together with this capability, I think we have something very powerful."

Javelins have been fielded to the Rangers, selected Special Forces units, and the 82d Airborne Division. So far, only light infantry forces have deployed to the training centers with Javelin, but it is not hard to imagine how much more effective mechanized forces will be when they, too, are equipped with this system: An infantry fighting vehicle will not only retain the long range armor killing capability of the TOW but will add a medium range, very lethal alternative system that is capable of multiple applications. The U.S. Army Infantry School is currently developing doctrine, techniques, tactics, and procedures to capitalize on the synergistic effects of Javelin.

Because of the obvious advantages of Javelin, military leaders requested early fielding and training. In conjunction with the U.S. Army Infantry Center and Javelin Project Office, fielding and training at Fort Benning began 18 months ahead of schedule. The fielding of the Javelin missile system to the 82d Division was completed eight months ahead of schedule. Training and fielding at both locations were conducted within program budget. In addition, the Javelin Project Office has instituted a DoD-mandated cost reduction plan that is designed to return $1.4 billion in total obligation authority. The plan is based on multi-year contracts and more than one may be broken if the Office of the Secretary of Defense reduces the total number of missiles to be produced.

The Javelin dramatically increases the ability of our forces to fight, survive, and win the next battle. Forces are already realizing the major warfighting enhancements that units equipped with the system bring to the modern battlefield. It provides light infantry, engineers, and marines with the firepower to hold terrain against enemy armored forces.

Javelin has proved its reliability, accuracy, and versatility to defeat all known armor and fortified fighting positions, and may be used to defeat attacking helicopters. It can be deployed anywhere in the world within hours to play its important role in peacekeeping or warfighting missions.

Major Bradley N. McDonald is the Assistant TRADOC System Manager for Antitank Missiles at the Infantry School and has served as a weapon system manager on other programs including the Future Scout and Cavalry System, the Future Combat System, and the Future Infantry Vehicle. He has commanded both Infantry and Armor companies. He most recently served as Assistant Project Manager (Up-Armor HMMWV).